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ABSTRACTS OF TUBERCULOSIS

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Congenital Cystic Disease of Lungs.—The position, size, number, and contents of cysts are determined by the extent and time that various deforming structures act upon the lungs in the foetus. Clinically there are two forms of cysts,—the infantile and the chronic. Infants have acute attacks of alarming dyspnoea which increase as they cry and struggle. They are cyanotic. The affected side is distended with air and the heart and mediastinum are displaced toward the sound side. The main bronchus acts as a valvular stenosis, so that with each succeeding breath more air is entrapped in the lung. These symptoms and physical signs have led to a mistaken diagnosis of spontaneous pneumothorax. The differentiation is made roentgenologically. In cystic disease of the lung a straight shadow, corresponding to the interlobar fissure, is seen traversing the translucent chest. The dyspnoea may be relieved by letting the air escape through a needle inserted in the chest. Six cases of the chronic form are presented. *Case 1:* A boy had had all the ordinary childhood diseases from which he recovered with no difficulty. At nine years of age he had what was thought to be pneumonia followed by empyema. Since that illness he had had attacks of fever about every six months. His chest had been periodically aspirated and finally drainage was established. At 20 years of age he was very thin, but felt fairly well except for dyspnoea on exertion. It was concluded, following studies of the chest by fluoroscopy and stereoscopic anteroposterior chest films, that a large pneumothorax occupied practically the entire upper half of the left chest with a partial collapse of the lower lobe; the right lung appeared free from disease. Studies made following the injection of lipiodol revealed a stenotic left lower bronchus and peripheral bronchiectasic dilatation in the partially collapsed lower left lobe with a bronchial fistula to the exterior. A chronic empyema with a bronchial fistula was diagnosed. Closure after the manner of Keller was attempted. The X-ray interpretation of a large pneumothorax was in reality a huge unilocular cyst of the upper left lobe, and the collapsed lower lobe, which consisted of a series of bronchiectatic cysts with the drainage-tube lying in one of these cysts. The condition was recognized at operation. Two large bronchi of the lower lobe were exposed, cut, and closed with fine black silk. The soft parts were dropped in over the stump and loosely united. The boy made a good recovery. He was discharged from the hospital two months later with a small sinus leading to the stump of the lower left main bronchus which still secreted a few cubic centimetres of mucopurulent material daily. At the end of two and a half years,

the boy is free from fever and sepsis but is much underweight. A minute bronchial fistula discharging a few drops daily still persists. *Case 2:* A young man of twenty years was admitted to the Tuberculosis Department of the San Francisco Hospital, giving a history of a dry cough of one week's duration, and haemoptysis of a tablespoonful four days previous to admission. Bronchoscopy revealed the carina in an oblique position. The left main bronchial orifice was smaller in diameter than that of the right and in its upper portion had a slightly granular appearance. This was not reddened nor did it bleed when touched. A small, apparently anomalous, bronchial orifice was noted on the right main bronchus which, on further study by X-ray following lipiodol injection, appeared to communicate with the left main bronchus. Fluoroscopic examination, while lipiodol was introduced into this bronchus through a catheter, plus the study of X-ray plates taken immediately afterward, led to the diagnosis of cystic dilatation of the bronchi. *Case 3:* A woman, 28 years of age, gave a history of cough of about five years' duration. She felt tired and at times dyspnoeic. She was in the fifth month of her fifth pregnancy. Two of her children were born before and two after the onset of the cough. Tubercle bacilli were not found in 6 specimens of sputum. On bronchoscopic examination the bronchi were not found to be obstructed but the right bronchial tree was very red and contained much pus. X-ray examination revealed a marked retraction of the heart and mediastinum to the right, dense opacity of the lower two-thirds of the right chest, and small translucent areas in the upper right lung field which suggested honeycombed type of cavitation or cyst-formation. The left lung was essentially clear. The case was considered one of foetal bronchiectasis. *Case 4:* A man of 43 years complained of cough and expectoration of 25 years' duration. He had his first haemorrhage fifteen years ago and has bled occasionally since. Sputum examinations revealed no tubercle bacilli. Bronchoscopic examination and lipiodol injection demonstrated a cystic right lung. *Case 5:* A man, 60 years of age, had had occasional attacks of cough and fever. Lipiodol injection demonstrated a thin-walled cyst in the right lower lobe and another at the costal diaphragmatic angle. *Case 6:* A robust man of 23 years had had a cough for years. At the age of twelve, while putting his shoulder to the wheel of a mired wagon, he suddenly began to cough, and after this was ill for three weeks with cough and expectoration. His chest was tapped and pus drained. After a few weeks the boy returned to his home. The cough had stopped but it returned three years later. Since then he has coughed and expectorated more or less. At X-ray examination of the chest a peculiar cyst-like cavitation was found throughout the left lower lobe. Injection of lipiodol demonstrated two large cavities and five small sacculi. Congenital cysts of the left lower lobe were diagnosed. The adult cystic lung produces no symptoms as long as it is not infected. When symptoms do occur, they are those of infection in the bronchial tree. The clinical signs vary with the extent and localization of the cysts and with the stage and character of the infection within them. X-ray plays perhaps the major rôle in the diagnosis. The shadow cast here again depends upon the extent of the condition and the contents of the cyst. Lipiodol will frequently demonstrate sacculations. However, it may be impossible to determine whether these sacculations are congenital or acquired. Bronchoscopy will in certain cases establish the diagnosis.—*Congenital Cystic Disease of the Lung, L. Eloesser, Radiology, November, 1931, xvii, 912.*—(*T. O. R.*)

Pneumonoconiosis.—The term "pneumonoconiosis" means, literally, "the condition of the lungs brought about by dust." It covers a great number of different conditions, varying with the nature of the dust acting on the lung, certain physical, biological and pathological conditions in the lungs, the reaction of different individuals to identical exposures, and the relationship of pathological conditions such as tuberculosis. In the production of silicosis, the granites and sandstones are the most dangerous. The diminution of the incidence of disablement and death from silicosis may be attributed to the improvement in the ventilation, lighting and amount of cubic space per man provided in the works, and the practice that has come into vogue of dressing stone in the open air; the introduction of machinery working wet; and the diminution in the incidence of active pulmonary tuberculosis amongst the general population. Clinically and pathologically, silicosis can be divided into simple silicosis and infective silicosis. It is of some importance to differentiate between these two conditions, for the prognosis may be different. Acute tuberculosis superimposed on silicosis is usually rapidly fatal, while true tuberculosilicosis, although a much more serious and more disabling condition than simple silicosis, is often a chronic, fibrotic and comparatively benign form of pulmonary tuberculosis, in which the usual pathological process is modified in the direction of excessive and massive fibrotic reactions lead-

ing to the walling-up of nests of bacilli within masses of fibrous tissue which tend to lose definition and to necrose. Dense pleural adhesions, subpleural plaques of irregular size, enlarged root lymph nodes with periadenitis, secondary bronchitis, and emphysema are characteristic of this condition. Eventually many of the cases succumb to tuberculosis. In simple silicosis, the hard, pin-point shadows of the primary stage are characteristic. In infective silicosis, the picture is more blurred and irregular from the beginning. The inflammatory infective process with consequent development of irregular masses of scar-tissue with tendency to necrosis and excavation is added to the silicotic islet formation, sometimes submerging the latter so completely that the presence of silicosis cannot be inferred from the radiographic appearances alone. Root shadows are more marked in infective than in simple silicosis. The exclusion of persons with latent or active tuberculosis, or with lungs otherwise infected, from the exposed industries, and the protection of the persons employed in these industries from infection, are essential measures in reducing and finally abolishing pneumonoconiosis and the disablement produced thereby.—*Pneumonoconiosis with Special Reference to Stonemasons, P. Heffernan, Tubercle, February, 1932, xiii, 193.*—(*M. E. P.*)

Silicosis.—In the provisions for the control of silicosis, the "engineering" measures include an adequate standard of mine ventilation; regulation of methods of blasting; arrangement of work in order to avoid unnecessary exposure to dust and fumes; and the employment of water to lay dust at its source or to remove it from the air when formed. The medical methods for the control of silicosis are centered in the activities of the Miners' Phthisis Medical Bureau which is a Government institution. Initial examination of all new recruits; periodical examinations of all working miners; benefit examinations of all miners claiming compensation; and decisions upon claims by dependents of deceased miners are under the control of this Bureau. Three distinct types are recognized: (1) simple or uncomplicated silicosis; (2) silicosis of the infective type but without evidence of active tuberculosis; and (3) tuberculosis with silicosis, in which a silicotic condition is conjoined with one of active tuberculosis. The essential feature of uncomplicated silicosis is the development of a nodular fibrosis of the lungs and visceral pleura due to the presence of aggregations of silica dust. There is always a corresponding fibrosis of the root lymph nodes with some bronchitis, bronchiolitis, and a varying degree of emphysema. The clinical condition is one of good general health, with a degree of respiratory disability which corresponds to the degree of fibrosis. The only specific X-ray sign is the characteristic discrete mottling which tends to develop first in the upper half of one or both lungs but in time is more or less symmetrically distributed throughout both lungs. The grave feature of silicosis is the high potential predisposition to the ultimate development of tuberculosis. It is characteristic that more chronic tuberculous infections tend to undergo an excessive fibroid reaction. This frequently results in extensive areas of fibroid consolidation which may show no evidence of tuberculosis except by guinea pig inoculation. The radiographs show more irregular fibrosis with sharply defined patches of opacity indicative of fibroid consolidation. Silicosis complicated by active tuberculosis is by far the most common cause of death. Among European miners manifest tuberculosis is more usually a terminal complication of silicosis although it may supervene at any stage of the disease. —*Control of Silicosis in Industry in South Africa, L. G. Irvine, Brit. M. J., April 16, 1932, no. 3719, 693.*—(*M. E. P.*)

Acute Silicosis.—It was not until 1929 that acute silicosis was recognized as a result of comparatively short exposure to alkaline silica mixtures in the manufacture of scouring soaps. Three cases are reported in which the appearance of respiratory symptoms after eight, twenty-one and twenty-nine months of exposure to an alkaline dust of high silica content marks a more rapid and severe silicosis than is usual. These cases were marked clinically by a severe decrease in the vital capacity, roentgenographically in two by considerable ventricular hypertrophy, and in the autopsy in one case by definite dilatation and hypertrophy of the right heart, and grossly by shrunken and fibrotic hardness of a considerable proportion of both lungs, especially the middle two-thirds. The right ventricular hypertrophy is probably explained by the increased resistance and loss of elasticity in the pulmonary vascular bed. Estimates of the silica content of the tissues of the first case, done by the method of King, suggest that the reaction in the lungs is not a direct, quantitative one and very likely, as Heffernan believes, the rapid development of fibrosis results from the accelerated formation of a silica hydrosol in the presence of the alkaline soap dust. Ordinarily this reaction progresses slowly in the faintly alkaline tissue fluids and may be so prolonged that symptoms do not appear until years after one has left a hazardous industry.—*Acute Silicosis,*

E. M. Chapman, J. Am. M. Ass., April 23, 1932, xcviii, 1439.—(*G. L. L.*)

Silico-Anthracosis.—The primary factor in the production of coal-miners' lung is silicosis. Coal-dust is retained in large amounts only when there is a high silica content and when the lymph drainage in the lungs has been impaired by the action of silica. Anthracosis is a special variety of silicosis depending upon the accumulation of coal dust in the silica damaged lung. A case is reported of "silico-anthracosis" presenting curious bodies similar to those found in asbestosis. Therefore it is suggested that these bodies are not peculiar to asbestosis, but that any spicule of insoluble material might have colloid deposited around it and become moulded into a curious body. The present view of the pathology of anthracosis would appear to necessitate a readjustment, not only of the accepted radiological interpretation of silicosis and the pneumonoconioses in general, but also of the clinical and industrial aspects of the disease.—*Silico-Anthracosis Presenting Curious Bodies Similar to those in Asbestosis, W. E. Cooke, Brit. M. J., April 9, 1932, no. 3718, 656.*—(*M. E. P.*)

Pulmonary Asbestosis.—Asbestos, a silicate, occurs in minerals in combination with iron, magnesium, calcium or aluminum. It differs from other minerals in that in its natural state it is fibrous and occurs in long silky strands which are highly resistant to heat, strong acids, and alkalis. During manufacturing processes the workers may be exposed to dust containing varying amounts of asbestos, asbestosis bodies may be found in their lungs. These are golden-yellow bodies, with a central core consisting of a minute asbestos fibre. The cardinal symptoms of asbestosis are dyspnoea and cough. Many patients complain of anorexia, lassitude, pains in the chest, and progressive loss of weight. The skin has an unhealthy, leaden hue. Corns are occasionally seen on the exposed skin. Expansion of the chest is limited. The physical signs are those of pulmonary fibrosis and predominate at the bases. The vital capacity is decreased. The diagnosis is made from a history of the patient's occupation, symptoms, physical signs, roentgenographic studies of the chest, and demonstration of asbestos bodies in the sputum. The disease is apparently progressive, not even the cessation of exposure to the dust checking its spread. The post-mortem findings of one case described by Dr. Page showed the pleura uniformly thickened to a slight extent on both sides; some recent plastic pleurisy was present. The lungs showed a diffuse fibrosis. On section, the trabeculae stood out prominently, forming a fibrous network. The lungs were congested and bronchopneumonic in patches. Microscopically the fibrosis was more prominent around the blood-vessels and less so in the alveolar walls. Some lymphocytic nodules and foreign-body giant cells were present in the fibrous tissue. Many golden asbestosis bodies were embedded in the fibrous tissue or clumped in the alveoli. The roentgenogram of a well-advanced case shows the diaphragmatic movement to be limited; the diaphragm indistinct in outline; thickening of the pleura in the costophrenic angle and along the costal margin on both sides to the apices; and the heart ragged in outline. In the early stages the lung fields show a slight relative increase in density in the lower zones, and occasionally calcareous deposits are scattered here. Later, there is a patchy increase in density in the lower zones, which may extend to the midzones, producing a fine network of fibrosis which appears to be of an alveolar or perivascular type.—*Pulmonary Asbestosis, J. V. Sparks, Radiology, December, 1931, xvii, 1249.*—(*T. O. R.*)

Benign Tumors of Bronchus.—Seventeen cases of benign tumors of the bronchus, 14 of which were observed clinically and bronchoscopically with biopsy, are reported. The essential clinical facts in these cases are (1) the first symptom may be an attack of pneumonia with or without pleurisy, (2) in 3 cases the initial symptom was dry pleurisy, and (3) purulent infection of the pleura occurred in 3 cases. The inevitable termination of all cases of bronchial tumors, whatever their initial symptoms, is suppurative bronchiectasis and suppurative or indurative pneumonitis. These two conditions are always found, if the obstruction is not relieved in time. In this group of patients, two-thirds of the benign tumors of the bronchus occurred before the age of 40 years. A unique form of dyspnoea, which may be very extreme due to change of posture of the patient, may be regarded as pathognomonic of benign tumor of the bronchus. Haemoptysis is one symptom of benign tumor of the bronchus which is most characteristic. Recurring haemorrhage may be the only symptom for years, before bronchial obstruction becomes manifest. It occurred as a more or less prominent feature in 10 cases. The haemoptysis is very apt to occur suddenly without any warning and unassociated with other symptoms of pulmonary or bronchial disease. The diagnosis of the obstructive stage rests upon a suggestive history of recurrent bleeding, supported by the physical findings of obstruction of a bronchus and evidence of suppurative disease of

the bronchi and lungs. These latter findings are usually demonstrated by the roentgen film. Bronchoscopic examination is the only certain proof of the existence of a benign tumor. The adenomatous polyp is the commonest type of bronchial tumor and was found in 12 of these cases. It always originates from the mucous membrane of a large bronchus, and is commonly situated not far from the origin of the bronchus. It is usually pedunculated, and is so placed that its free bulbous end is directed toward the trachea. The body of the tumor has a smooth surface and is covered by a layer of epithelium. This often shows a squamous metaplasia which may result in a carnified stratified covering. In the basal part of the tumor, where it is attached to the bronchial wall, the epithelium may be normal or it may be made up of a stratified layer of columnar epithelium. Beneath this there is a completely intact basement membrane. Subjacent to the latter there is often a layer of loose connective tissue within which are numerous dilated blood-vessels. Erosion of these vessels often gives rise to bronchial haemorrhage.—*Benign Tumors of the Bronchus, H. Wessler and C. B. Rabin, Am. J. Med. Sc., February, 1932, clxxxiii, 164.—(W. I. W.)*

Lymphogranulomatosis.—In a typical case of lymphogranulomatosis, after a longer or shorter time, infiltration of the ventral periosteum of the vertebral column takes place, with often a subsequent encroachment upon the spinal cord and epidural fat, so that root-pains and paraplegia may develop as compression phenomena. Autopsy evidence indicates that some infiltration is present even in the absence of neurological findings. The involvement of the periosteum occurs by direct contact with an involved lymph node, the pathological process extending to extracapsular tissue. The differential diagnosis between lymphosarcoma and malignant lymphogranuloma can often not be made during life, even following biopsy of an involved lymph node. It is not as yet certain if Hodgkin's disease is a granuloma or a neoplasm. If the former, a virus is in all probability the cause, if the latter it is due to the unknown neoplastic agent.—*Betrachtungen über die Lymphogranulomatosis maligna, F. P. Weber and O. B. Bode, München. med. Wchnschr., May 6, 1932, lxxix, 744.—(V. T.)*

Thoracic Metastases in Cancer of Ovary.—A women, 52 years of age, had symptoms and signs of malignant tumor of the lung with no abnormal abdominal findings. Postmortem examination revealed a primary carcinoma in the left ovary, with metastases to the mesentery, omentum, anterior mediastinum and pleura.—*Thoracic Metastases in Ovarian Carcinoma, H. T. Evans and G. I. Strachan, Brit. M. J., March 19, 1932, no. 3715, 519.—(M. E. P.)*

Tuberculosis and Cancer.—*Case Report:* A woman 32 years of age, developed a fistula of the left foot 15 years ago. This was treated by surgery and X-ray radiation. Eleven years ago she developed pulmonary tuberculosis and her foot lesion was diagnosed as tuberculosis of the bone. A few months ago the foot lesion became very painful and a biopsy revealed nonspecific granulation tissue. Eight months later, another biopsy showed a squamous-cell carcinoma which formed the indication for an amputation. It is pointed out that the coincidence of tuberculosis and cancer on the extremities is an exceedingly rare occurrence.—*Ueber die Vergesellschaftung von Tuberkulose und Karzinom, O. Hoche, Wien. klin. Wchnschr., May 6, 1932, xlv, 589.—(M. P.)*

Scarlet Fever and Tuberculosis.—There appears to be a definite relationship between tuberculosis and scarlet fever in the sense that the presence of tuberculosis greatly augments the toxicity of scarlatinal infections. This conclusion is based on the following observations: In the years 1927 to 1929, inclusive, the cases of scarlet fever observed at the Children's Hospital in Bucharest were of varying degrees of intensity but not uniformly malignant. In more than half of the fatal cases which were autopsied evidences of extensive tuberculosis were found, usually of the tracheobronchial lymph nodes. These cases died during the first 3 or 4 days of the disease with symptoms of marked toxicity. The percentage of tuberculous lesions found in autopsies of children dying of other infectious diseases was much lower. During 1930 the epidemic of scarlet fever was of a highly malignant character. In this series autopsies revealed tuberculosis only rarely. The author hypothesizes a converging toxic effect of tuberculosis and scarlet fever, especially on the suprarenal cortex and liver.—*La tuberculose, facteur de malignité dans la scarlatine, O. Millian, Arch. de Méd. d. Enf., March, 1932, xxxv, 130.—(M. D.)*

Tuberculin Reactions and Measles.—In 14 of 16 children with positive tuberculin reactions (scarification) the reaction became negative during the development of measles, as a rule about the thirteenth day after exposure to the disease; that is, 24 to 36 hours before the appearance of the exanthem. In

the 6 cases which were subsequently followed daily, the positive reaction reappeared as a rule about one week after its disappearance. Twelve of the children were followed for ten to twelve months after measles. Three of these died about two months following the disease, two of caseous pneumonia, one having had previously existing hilar lymph-node tuberculosis, and a third of tuberculous meningitis. The other 9 children, one of whom had previously existing hip tuberculosis, showed no evidence of lowered immunity following measles. Of 63 children with negative tuberculin reactions none showed evidence of tuberculosis following measles. The authors feel that in measles (and in no other disease except possibly grippe) there is almost regularly a loss of tuberculin allergy. The lowering of resistance to tuberculosis which sometimes occurs during measles is, however, probably due more to local factors in the respiratory tract than to loss or diminution of immunity.—*Rougeole et cuti-réaction tuberculinique, P. Lereboullet and P. Baize, Arch. de Méd. d. Enf., December, 1931, xxxiv, 701.*—(*M. D.*)

Treatment of Amyloidosis with Liver.—The development of amyloidosis in surgical tuberculosis, although comparatively rare, usually points toward a fatal termination. The symptoms, emaciation, waxy yellowish pallor, severe secondary anaemia, large prominent abdomen with markedly enlarged and firm liver and spleen, ascites, and large quantities of albumin in the urine with waxy casts in most cases, are present in varying degree as the condition progresses. The advantage of the use of the liver meal in the treatment of secondary anaemia led, as if by accident, to its use in the treatment of the 7 reported cases. All seven had tuberculous infection of the bones, complicated by discharging sinuses for a period of two years or more. The classical symptoms were present in all in varying degrees. The Congo-red test was positive in all. Three had far advanced amyloidosis secondary to Pott's disease and four had moderately advanced amyloidosis, two of which were secondary to tuberculosis of the hip, the other two secondary to knee-joint infection. All seven were growing progressively worse. The treatment consisted in the administration of a preparation of concentrated powdered, whole liver in 3 daily doses of 4 gm. each for a period of two years in addition to rest in bed, adequate diet and daily heliotherapy. Of the 7 treated children, two died. One died five months after treatment was begun of an intercurrent pulmonary infection. One died four months after institution of this therapy. Before death the liver and spleen had decreased in size, the anaemia had improved and the general condition seemed better until frequently recurring ascites developed. This fluid was removed several times. The cause of death was cardiac failure secondary to the ascites. No autopsy was obtained. The ascites was probably due to portal obstruction by scar-tissue, which developed as the amyloid was in the process of resorption. The other 5 children are alive and all are considerably improved. After three months of therapy, improvement was definite. The favorable retrogression of the amyloidosis was more rapid than the improvement in the tuberculosis. By the eighteenth month all clinical symptoms of amyloid disease had disappeared. The Congo-red rest was positive in all. The tuberculous disease in all had healed or improved a very great deal at the end of the eighteenth month.—*Liver Meal in the Treatment of Amyloidosis in Surgical Tuberculosis, B. H. Whitebeck, J. Bone & Joint Surg., January, 1932, xiv, 85.*—(*J. F. B.*)

Red-Cell Sedimentation in Pulmonary Tuberculosis.—The value of repeated estimations of the sedimentation rate is emphasized in the prognosis of pulmonary tuberculosis. Low rates are generally as of good prognostic significance, although in emaciated patients with advanced disease low readings may be obtained, due probably to diminished fibrinogen and a lowered concentration of the serum-protein. The persistence of marked increases in the rate generally indicates a bad outlook. A rise in the rate may be the first warning sign of increased activity of a lesion.—*The Blood Sedimentation Rate in Pulmonary Tuberculosis, H. Roche, Brit. M. J., March 12, 1932, no. 3714, 466.*—(*M. E. P.*)

Osler and Tuberculosis.—Speaking from personal recollections of Osler and his work in Oxford, the pioneer work in the use of a dispensary system in rural areas is recalled. Osler's interest in antituberculosis efforts led to the organizing of a dispensary at the Radcliffe Infirmary and 8 branches within Oxfordshire. His views on the methods necessary for the eradication of tuberculosis may be summarized as follows: early notification, dispensaries attached to hospitals, close coöperation between tuberculosis officers and private practitioners, and homes for advanced cases. At one time he raised funds for a small institution at Shotover, but this never materialized. There is now, however, as part of the Radcliffe Infirmary extension, the Osler Pavilion, a 40-bed hospital for cases of tuberculosis.—*Osler and*

Tuberculosis, W. Stobie, Brit. J. Tuberc., January, 1932, xxvi, 23.—(R. D.)

Koch's Work in Tuberculosis.—Koch upheld the idea of infection by inhalation in pulmonary tuberculosis, especially by the inhalation of dry dust and, to a smaller degree, of the so called mouth-spray droplets. A controversy as to possible routes of infection has been going on for many years, and to-day there is again a return to Koch's standpoint. Behring and, later, Calmette supposed infection to take place through the intestinal tract at an early age, and they thought that milk was the carrier of the bacillus, but these theories are generally abandoned. Earlier experiments conveyed the impression that bacillus-laden dust reaches the lungs with much more difficulty than moist droplets do. However, more recent work has confirmed Koch's teaching. Nearly ten years after the discovery of the tubercle bacillus Koch surprised the world with the discovery of tuberculin. The enthusiasm for its therapeutic value, however, soon vanished to a large degree. But the discovery of tuberculin proved in other ways to be fertile, and carried the seed for other discoveries. The diagnostic value of tuberculin has been established. Systematic tuberculin tests reveal that 70 to 90 per cent of all human beings are infected with tubercle bacilli. Tubercle-free human beings, for instance, newborn babies, do not react to large doses of tuberculin, whereas infected, apparently healthy individuals react to tuberculin even in high dilution. The effect of tuberculin is, broadly speaking, based on specific hypersensitiveness. Behring used this word for a state of heightened sensitiveness to tetanus and diphtheria toxin; Pirquet studied so called serum-sickness as an expression of hypersensitiveness to horse-serum. In these cases, in differing form, we see the same fundamental phenomenon of specific hypersensitiveness as Koch found it in tuberculin. Koch also introduced the idea of relation between hypersensitiveness and immunity. It is often found that, in the home of a person with open tuberculosis, the other members of the family, especially the children, react to tuberculin; that is, they have been infected. There arises the practical, important question of whether to protect these children from further infection by removing them from the home. On the ground of Koch's early experiments one may say that in such cases one need not be too hasty in removing them. In 1901 Koch once more caused surprise with his statement on the relatively slight infectiousness of the bovine bacillus for man. Koch stimulated research which showed that bovine infection in children is frequent and that it may cause all forms of tuberculosis. Hygienic measures may prevent bovine infection and its frequency is regarded as a criterion of the milk hygiene in any country. Koch's teaching that the human type of tubercle bacillus causes no progressive tuberculosis in cattle has been confirmed. Koch has shown furthermore that cattle infected with the human tubercle bacilli stand deadly doses of the bovine type without damage and thus demonstrated that a high degree of specific immunity against tuberculosis may be obtained. All later experiments on protective vaccination of men and cattle against tuberculosis are based on this observation by Koch.—*Das Tuberkulosewerk Robert Kochs, F. Neufeld, Deutsche med. Wchnschr., March 25, 1932, 497.—(H. S. W.)*

Teaching of Tuberculosis.—An elective course in tuberculosis was instituted at the University of Glasgow in 1919. The importance of the subject was recognized by the students and the course was always well attended despite practical difficulties in the way of distance to the dispensary and to the sanatorium. Since 1927 the course has been compulsory. The outline of the subjects taught shows that emphasis is laid on physical diagnosis and X-ray, bacteriology, special diagnostic procedures, complications, and general topics. The course apparently fills a real need in the preparation for a medical career.—*The Teaching of Tuberculosis, J. Crocket, Brit. J. Tuberc., April, 1932, xxvi, 76.—(R. D.)*

Tuberculosis and Temperament.—Mental changes in tuberculosis relate principally to temperament and character. Tuberculosis patients are said to show a common range of traits, which may represent either normal temperaments or alterations of original temperaments occasioned by toxaemia or other causes. Experimental investigation confirmed the existence of a common range of traits in tuberculous children. Differences in traits as revealed by different clinical types were noticed. Quiescence of the disease seemed to be accompanied by quiescence in temperamental expression. The common traits revealed represent deviations from ordinary temperaments. Temperamental expression is thus capable of being affected by lesions, probably through the nervous system. Evidence is lacking to verify the theory of efflorescent genius in tuberculosis cases. Possibly this phthisical genius is a matter, not of cognitive changes, but of temperamental changes. A peculiarly refined temperament, which is

all too rare, must be postulated. The psychological effects of tuberculosis possess prognostic value. When they become further determined, they will provide a valuable aid to diagnosis.—*Tuberculosis and Temperament, K. H. R. Edwards, Brit. J. Tuberc., October, 1932, xxvi, 172.*—(*E. H. K.*)

Psychology of Consumptive.—Modern psychology proves that the important influences upon the psyche of individuals are much more those that occur in early childhood and in the teens than those of later life, even when those of a protracted illness are considered. The sexual factor is a most important one and cannot be denied. Another of the factors high in influence is the will to power. And the flight to illness as a means of escape from an abhorred situation is very important. These main factors are discussed and illustrated in the lives of R. L. Stevenson, D. H. Lawrence, A. Tchekhov, Mrs. Browning and John Keats. —*The Psychology of the Consumptive, S. V. Pearson, J. State Med., August, 1932, xl, 477.*—(*J. F. B.*)

Tuberculosis and Social Welfare.—The reduction of the death-rate from tuberculosis in the City of Belfast from 4.7 per 1,000 in 1890 to 3.1 per 1,000 in 1930 has been accomplished. Social welfare work has contributed largely but not entirely to this decreased death-rate. The angles of attack upon this problem have been many. They may be enumerated in the order of their importance as: *1:* The quality, quantity and purity of food have all been increased. *2:* The quality of clothing has shown enormous improvement and cleanliness has been emphasized. *3:* Family homes have increased by 27,000 in a population of 1,250,000. *4:* Conditions of labor have improved a great deal primarily through reduction in hours of labor, lessening of the amount of dirt and dust while increasing the air, space and light per individual. *5:* General health measures, which include ample supply of pure water, emphasis on absolute cleanliness, maternity and infant welfare clinics and compulsory education, have also added greatly to the building up of resistance to disease in general.—*Tuberculosis in Relation to Social Welfare, R. D. Bates, J. State Med., August, 1932, xl, 435.*—(*J. F. B.*)

Tuberculosis and Suicide.—Apparently both the laity and physicians think of tuberculosis and suicide as being frequently associated. Two coroners of large experience could not recall any case of suicide with tuberculosis as the motive. The newspaper reports of suicides in Brighton, England, were compared with the tuberculosis notification and death-records. During the period of ten years from 1921 to 1930 there were 18,578 deaths from all causes. Of these 1,225 were due to pulmonary tuberculosis. During the same period there were 207 suicides. Of these only two were known to have had tuberculosis. Unemployment in one case, and poverty and loneliness in the other case may have been contributory motives. No cases of attempted suicide were those of known tuberculous persons. The usual optimism and the lack of pain in tuberculosis and the fact that tuberculosis seldom leads to insanity are aspects of the disease which render it unlikely as an incentive to suicide. Also, tuberculosis has no longer its old reputation of incurability.—*A Note on Tuberculosis and Suicide, A. N. Cox, Brit. J. Tuberc., October, 1931, xxv, 173.*—(*R. M. F.*)

Unemployment and Reduced Mortality from Tuberculosis.—Statistical material shows that industrial unemployment has exerted a restricting influence on the spread of pulmonary tuberculosis. Especially is this true of the number of male patients. This fact may be explained by the relative functional inactivity of the lungs of the idle population which in a sense may be compared to an involuntary rest cure.—*Zur Endemiologie der Frankfurter Tuberkulose, L. Ascher, Deutsche med. Wchnschr., June 10, 1932, lviii, 938.*—(*H. S. W.*)

Tuberculosis in Medical Students.—Adequate statistics for this particular group, and for a comparable control population are lacking. At Western Reserve School for Medicine, 11 cases of pulmonary tuberculosis and pleurisy with effusion occurred between 1923 and 1931. During a 5-year period, 1926–1931, 10 cases occurred at Johns Hopkins. Each school had an average enrollment of 250. The morbidity rate of 6.5 per 1000 is unusually high. The Army morbidity rate was 2.72, that of the Navy 2.49 for 1927. Careful studies at the University of Pennsylvania, using intracutaneous tuberculin and stereoscopic X-rays, showed 1 active case among 279 college students with an average age of 19.3 years, and 14 cases among 452 medical school students with an average age of 23.6 years. In this same study apical infiltration unassociated with signs or symptoms was found in 3.2 per cent of college students and first-year medical students, but in 11.6 per cent of second-, third- and fourth-year medical students. More marked infiltrations were found in the third- and fourth-year groups. At Johns Hopkins, apparently healed apical

lesions were found in 11 of 220 first-year students, in 2 of 50 second-year, and in 5 of 44 third- and fourth-year students. Intracutaneous tests, using 0.1 cc. of a 1:1000 dilution of O. T., showed 56.9 per cent of 137 first-year students, 77.9 of 68 second-year students, 93.5 of 62 third-year students, and 91.5 per cent of 47 fourth-year students to be positive. This marked change in the third- and fourth-year group seems significant, as the previous surroundings of the groups were comparable and the age-difference was not large. Among a number of upper-class reactors, slight constitutional disturbances followed the test, while none occurred among first-year students. The average area of infiltration was 14.9 mm. in the first-year group and 20.3 mm. in the second-, third-, and fourth-year groups. Among Johns Hopkins medical students, of 76 negative to the tuberculin test (0.1 mgm.), 44, or 57.9 per cent, showed evidence of tuberculous lesions on X-ray, three having localized apical infiltration. Accepting as evidence of tuberculous infection either a positive tuberculin reaction or a lesion disclosed by X-ray, the proportions of infected medical students at Johns Hopkins according to classes are as follows: first-year 79 per cent; second-year, 91 per cent; third-year, 100 per cent; and fourth-year, 98 per cent.—*Tuberculous Infection in Medical Students, N. B. Herman, F. H. Baetjer and J. A. Doull, Bull. Johns Hopkins Hosp., July, 1932, li, 41.*—(*R. D.*)

Declining Tuberculosis Death-Rate in Germany.—The tuberculosis mortality in Germany continues to decrease in spite of the present prolonged industrial crisis. Yet tuberculous infection has not been found to have decreased, as shown by the Pirquet test, which still reveals a 100 per cent infection of adults. Apparently the infection of children has been postponed to a somewhat later period. There is statistical evidence that the earliest and greatest decrease in tuberculosis mortality occurs in the older and the oldest people. For this, improved hygiene and social circumstances is probably responsible. For this group a decrease in hard work and an increase in rest is beneficial. The short-hour day, or even present day unemployment of the adult population, may have had the same favorable effect. This good influence of enforced rest holds, of course, only as long as sufficient food is available.—*Die unverminderte Abnahme der Tuberkulose Sterblichkeit, L. Ascher, Deutsche med. Wchnschr., February 26, 1932, lviii, 341.*—(*H. S. W.*)

BCG.—The strains of *BCG* used in this investigation were obtained from Prof. Calmette, one in 1921, and the other in 1927. They proved to be identical, but the former was used almost to the exclusion of the latter for passage and immunity experiments. The 1921 strain was subcultured on glycerin-bile-potato for about 18 months (16 transfers), and maintained afterward on plain egg or glycerin-egg without bile. On egg three chief forms of large colony have been distinguished: (1) flat, spreading gray or grayish-white colonies with granular surface and heaped-up warty centre; (2) colonies with a hollow or depressed centre; and (3) convoluted heaped-up colonies with a broad sloping grayish-white granular margin. This is the *R* colony of Petroff and is seen most commonly on glycerin-egg. Subcultures of these colony variants showed no distinguishing features and in virulence tests behaved like the parent strain. The serological reactions of the strain are those of mammalian tubercle bacilli. *Virulence tests: BCG* was tested in 88 guinea pigs, 26 by intraperitoneal and 62 by cutaneous inoculation, in doses ranging from 1.0 to 200 mgm. Two of the intraperitoneally inoculated pigs died acutely in seven to nine days respectively from the irritant and toxic action of the bacilli which were disseminated throughout the body. Two guinea pigs died from peritoneal adhesions. No other guinea pigs inoculated intraperitoneally with *BCG* died from tuberculosis as a result of the injection, the duration of the experiment ranging up to 421 days. Autopsies on guinea pigs which had lived some time after the injection of massive doses of *BCG* often showed small abscesses containing creamy pus in which acid-fast bacilli were abundant. In the guinea pigs receiving *BCG* subcutaneously a massive dose (10 to 400 mgm.) gave rise to swellings of varying size in the abdominal wall. About the tenth day this usually ulcerated and the abscess discharged its caseopurulent contents. The ulcer healed rapidly. The adjacent inguinal lymph nodes underwent enlargement which in most instances was slight and transient. None of the 62 animals inoculated subcutaneously showed visceral lesions, although many received relatively enormous doses. In six weeks the adjacent nodes were usually normal in size and appearance. *Survival of BCG in the body of the guinea pig:* The viability of *BCG* after injection into the guinea pig was tested by seeding egg and glycerin-egg with material from different tissues, or pus from abscesses. The life of *BCG* in the guinea pigs was comparatively brief. There is possibly some multiplication of bacilli after inoculation, but this evidently soon ceases and the bacilli gradually die. In a few instances numerous colonies were obtained from abdominal pus

10 to 11 weeks after inoculation, but generally the colonies from pus or tissues were few. The longest period elapsing between the inoculation of the guinea pig and the recovery of the bacillus in culture was 103 days. *Absorption of BCG from the alimentary tract of the guinea pig:* Twenty-six guinea pigs were fed with *BCG* by pipette, with doses from 30 to 300 mgm. Fourteen of the guinea pigs were young, weighing from 70 to 110 gm. The guinea pigs were killed after from 5 to 84 days, and cultures were sought from lymph nodes from the neck and mesentery, and also from the spleen. Acid-fast bacilli were abundantly present in smear preparations of the faeces during the first two or three days after feeding, and in one instance were not completely eliminated from the intestinal canal on the eleventh day. Very few bacilli appear to have passed through the alimentary mucous membrane, as indicated by the failure in 17 out of 26 cases to cultivate the organism from the lymph nodes of the alimentary tract. Many of the negative results were obtained with guinea pigs which, though not newborn, were very young, seven weighing 70 to 80 gm. (5 negative) and eight weighing from 105 to 180 gm. (8 negative). These results therefore do not support Calmette in his opinion that the alimentary mucous membrane of young animals is more permeable for bacteria than that of older animals. *Experiments on rabbits: Inoculation:* Inoculated subcutaneously (50 mgm.) *BCG* gives rise in the rabbit to a local abscess only; the adjoining lymph nodes and internal organs remain free from lesions. *BCG*, given intravenously, sometimes results in death. Twenty-four rabbits were inoculated intravenously (0.25 to 50 mgm.), and, of these, 12 died in from 7 to 19 days with consolidation of the lungs, and the rest recovered. Such inoculations produce definite tuberculosis. The lesions, however, although more distinct and lasting than in the guinea pig, have, like those in the latter species, no progressive tendency. There is a critical period in the life of a rabbit, inoculated intravenously with *BCG*, in which the animal may die (7 to 19 days). The cause of death has been pneumonia. If the pneumonia is not so extensive as to cause death mechanically, the animal recovers and after five or six months no trace of the infection is left, or only slight traces in the form of isolated miliary, encapsulated or calcified tubercles, or, as in one rabbit, scar tissue. No joint lesions have been found in any of the rabbits inoculated with *BCG*. *Feeding experiments:* Young rabbits were fed with *BCG*, some repeatedly. Extremely small portions of the *BCG* were absorbed from the alimentary canal, only an occasional rabbit showing minute foci in the mesenteric lymph nodes. The organism was cultivated only from the submental nodes, probably because of the method of introducing the bacilli (pipetting between the lips without opening the jaws). *Experiments on goats:* Eleven goats were inoculated intravenously, the doses ranging from 5 to 100 mgm. Nine died,—2 in seven and fifteen days and 7 in from twenty-seven to one hundred and one days,—and two were killed one hundred and twenty-seven and three hundred and twenty-four days after inoculation. The 2 latter and 6 of the 9 fatal cases showed no macroscopic lesions, and *BCG* was not recovered from the tissues. In the remaining 3 goats there were definite tuberculous lesions. The goats showed no apparent cause of death. *Experiments on fowls:* Seven fowls were inoculated with *BCG*, 3 intravenously and the others intramuscularly. The intravenously inoculated were killed in from 113 to 135 days and the others in from 112 to 603 days. The former group showed no lesions, the latter some yellow necrotic substance in the muscles. Cultures from both groups remained sterile. *BCG* is not virulent for the fowl and soon dies out locally in the organs. *The virulence of BCG after residence in the animal body:* Seventeen strains of *BCG* recovered from different animals were tested as to virulence by guinea-pig inoculation. This showed conclusively that *BCG* does not contain a virulent element. *Conclusion:* These investigations support Calmette's contention that *BCG* may be used as a vaccine without risk of causing progressive lesions.—*A Study of the BCG Strain of Tubercle Bacillus. With an Account of Two Immunity Experiments and a Preliminary Report on the Cultivation of Tubercle Bacilli on Bile Media. A. S. Griffith, Lancet, February 6 & 13, 1932, ccxxii, 303 & 361.*—(*J. S. W.*)

Lübeck Disaster.—In 1930 in Lübeck 68 infants died of tuberculosis following a protective vaccination (oral administration) with *BCG*. Three physicians, under whose supervision the treatment was given, were sentenced to penitentiary terms of 1, 2, and 3 years, respectively. Testimony of eminent physicians convinced the court that the infants were erroneously vaccinated with a human (Kiel) strain of tubercle bacillus instead of (or possibly with) the *BCG* strain. Briefly reviewed, the course of events were these: In the summer of 1930 all cultures of tubercle bacilli in the city laboratory of Lübeck perished by being overheated. A virulent culture was acquired from the city

of Kiel. This strain had a characteristic greenish color on Sauton's medium, and the tubercle bacilli recovered from the sick and dead children, when cultured on the same medium, showed the same green discoloration. Mutation of the *BCG* strain into a virulent tubercle bacillus was discarded by the special commission as a probable cause of the death of the children. Animal inoculation of the vaccine before administration was omitted, unfortunately. Other negligence in the laboratory routine was exposed by the commission. Lübeck, a city of 100,000 inhabitants, has a yearly infant mortality rate from tuberculosis of about 8, and some observers have advanced the idea that vaccination was not indicated. The protective action of *BCG* vaccine is generally thought to be small and of short duration. The Imperial Health Council previously recommended a waiting attitude as to the vaccination, and, in this instance, this body had not been consulted. One hundred and fifty infants were made very sick as a result of the feeding of tubercle bacilli, by which billions of virulent tubercle bacilli have been administered to infants immediately after birth. Autopsy of the dead infants (68) showed intestinal tuberculosis. A form of tuberculosis had been produced such as one rarely sees under normal circumstances. Enormous masses of enlarged lymph nodes of the cervical, bronchial and mesenteric groups, associated with small nodules in liver, spleen, kidneys, and lungs were observed. There were primary effects in the mucosa of the mouth, pharynx, intestines and lungs; in some instances multiple primary effects have been observed. The court took the position that a mutation of *BCG* vaccine into virulent tubercle bacilli may be possible but that it did not come into consideration in this case, and that actually a mix-up or contamination of the vaccine with a virulent tubercle bacillus occurred in a way which has not been cleared up in detail. However, the management of the laboratory routine, the transferring of the *BCG* strain and the virulent strain of tubercle bacilli in the same room and by the same person and the fact that no current notes were made, allowed such a mistake to creep in readily.—*Betrachtungen über das Lübecker Kindersterben im Anschluss an die Tuberkulose immunisierung und den Lübecker Process, W. Kolle, Deutsche med. Wchnschr., February 13, 1932, lviii, 304 & 342.—(H.S.W.)*

Lübeck Disaster.—In Lübeck in 1930, 250 infants were vaccinated with *BCG*. Of these, 76 died of tuberculosis and 13 fell more or less sick. The sick infants showed enlargement of the cervical and mesenteric lymph nodes, enlargement of the spleen, and foci in the lungs. Sixty-one of those that died were examined at autopsy. Twenty per cent had only intestinal tuberculosis (*BCG* was fed). Fifty-one per cent had intestinal and cervical tuberculosis, twenty per cent had tuberculosis of the intestines, stomach and oesophagus, and only 2 per cent had pulmonary tuberculosis. Portals of entry of the infection were the tonsils, the pharynx and the middle ear. There was frequently a tuberculous peritonitis and tuberculous meningitis. Bacteriological studies showed that the vaccine used contained virulent human and avirulent bovine tubercle bacilli. Cultures from 28 dead infants gave virulent human bacilli in every instance, and avirulent (*BCG*) bacilli in a few. Most of the testifying experts held that a mutation of the *BCG* bacillus into a virulent type was possible but, in this case, highly improbable. Several characteristics of tubercle bacilli obtained from the dead infants, such as changing virulence, lipoid content, peculiar growth and coloration of the culture speak for contamination of the *BCG* vaccine with a virulent human tubercle bacillus (Kiel strain). The preparation of the vaccine was unnecessary, as it could have been obtained from the Pasteur Institute or the German official health centres. This would have guaranteed its avirulence and its safety. Besides, many exceptions could be taken to the way in which it was prepared.—*Rückblick auf die Grundlagen und Lehren des Lübecker Prozesses, M. Hahn, Deutsche med. Wchnschr., March 4, 1932, lviii, 380.—(H. S. W.)*

Advantages and Disadvantages of Pasteurization.—Compulsory pasteurization of milk is associated with both advantages and disadvantages. Among the latter, the chief result will be the eventual disappearance of certified milk. The producers of certified milk do a great deal of valuable scientific study, especially on streptococcic sore throat, and a great deal of advertising which has considerable educational value for the public. Besides, raw milk may be needed under several circumstances and is at its best and safest in certified milk. Producers of certified milk have been of great help in forwarding the schemes of tuberculin testing and tuberculosis eradication. In general, health officials regard pasteurized milk as being safer than nonpasteurized milk. At the same time they do not jeopardize the health of the community by allowing certified milk to be sold.—*Advantages and Disadvantages of Pasteurization of all City Milk, W. A. Evans, Journ. Am. Veterin. Med.*

Assn., March, 1932, lxxx (n. s. xxxiii), 370.—(H. S. W.)

Certified Milk.—Milk is a variable food product, variable both in its degree of nutritive qualities and in its potentialities for harm to its consumer. The remedy for variation is permissible within limits and is recognized in the several grades of milk. But safety (meaning absence of living pathogenic bacteria) is not permissible as a variable. Certified milk may be considered ideal milk, but the practicability of its large-scale production so restricts it as to make it almost negligible in most communities. Even an ideal raw milk may be objected to because of the possibility of danger from the bacteria it might contain. Pasteurization has no serious drawbacks, but it should not be used as a tool to lower the grade of milk on the argument that low-grade pasteurized milk is safe. The technique of carrying out pasteurization may at times be faulty and thus pasteurized milk may become a source of danger. Certified milk represents an ideal which should be preserved. This may not be preserved if blind dependence be laid upon pasteurization solely. Requirements for certified milk are uniformly high but our requirements for pasteurized milk as to quality are in a chaotic state.—*Why Certified Milk? W. Giltner, Journ. Am. Veterin. Med. Assn., March, 1932, lxxx (n. s. xxxiii), 375.—(H. S. W.)*

Tubercle Bacilli in Milk.—A detailed report is given of the results of routine examinations of milk for tubercle bacilli during the past twenty years. Direct film examination of centrifugated deposits, guinea-pig inoculation and cultural methods have been in common use. Records are given of 1560 milk samples examined by animal inoculation in which 9.1 per cent positive tests were found. In laboratories in which only one guinea pig is used for each sample, 9.4 per cent of these gave inconclusive results due to intercurrent disease of the animal or to heavy infection of the milk. In bulk-milk samples, only 0.6 per cent gave positive direct films, but single cow samples were found more frequently to be positive. Excess of cells as an indication of infection in bulk samples proved to be fallacious. Out of 30 samples of condensed milk, one was found to have a positive film but guinea pig inoculation proved negative. In a series of 101 Grade-A milk samples, 52 Grade-A tuberculin tested yielded 2 positive inoculation tests and 49 Grade-A nontuberculin-tested 5 positive tests. Three hundred cultural experiments were made on various media with varying quantities of centrifugated milk deposits. Seven positive results were obtained as compared with 25 positive guinea-pig results. The Sweany and Evanoff media appeared to give the best results. Judging from these figures, there appears to have been little, if any, reduction in the prevalence of tubercle bacilli in milk during the last twenty years. Guinea-pig inoculation, although slow and expensive, appears to be the only reliable test for bulk-milk. Cultures prove to be of value in single samples. The writer has not met with a recorded instance of the human strain of tubercle bacilli in milk but avian strains have been found. The bovine strains apparently are not of equal virulence. In two instances, 1 cc. of uncentrifugated milk from a bulk-sample was sufficient to infect a guinea pig. This fact has some bearing on the risk of infection of infants with the bovine bacillus.—*The Presence of the Tubercle Bacillus in Milk, S. R. Gloyne, Tubercle, July, 1932, xiii, 443 & 488.—(M. E. P.)*

Milk and Tuberculosis.—Milk is responsible for the vast majority of cases of bovine tuberculosis in man. The notifications of nonpulmonary tuberculosis have dropped during the past eighteen years from 36,000 to 18,000 (England and Wales), of which about 4,000 are probably due to the bovine bacillus. Deaths from tuberculosis of bovine origin have fallen from about 3,500 in 1918 to 2,000 in 1927. The reasons for these decreases may be as follows: (1) decrease in incidence of tuberculosis in cattle; (2) the use of dried and pasteurized milk in infant feeding; and (3) improved standard of wages and nutrition. Statistical work done by Bartlett and Fisher indicates that raw milk has more nutritional value than pasteurized milk. The author's statistics indicate that boys obtain greater relative benefit from raw milk than girls. Mattick and Golding found the same thing true of buck rats as compared with does. Other workers conclude that freshly boiled milk has more nutritional value than the pasteurized. Experimental work has shown the higher death-rate and disease incidence in animals which are improperly fed.—*The Milk Question and Tuberculosis, R. S. Williams, Brit. J. Tuberc., July, 1931, xxv, 107.—(R. M. F.)*

Bovine Bacillus in Human Tuberculosis.—Extensive investigations during the last 20 years have demonstrated that bovine infection is responsible for a considerable proportion of human tuberculosis in Great Britain. This disproves Robert Koch's conclusion, made thirty years ago

that infection of human beings with bovine tubercle bacilli was so rare that it was unnecessary to take special measures to prevent it. Out of 1,321 cases of nonpulmonary human tuberculosis, 35.3 per cent were found to be infected with the bovine tubercle bacillus. Out of 1,040 cases of pulmonary tuberculosis, 2.3 per cent were definitely attributable to the bovine bacillus. It is estimated that about 2,000 deaths, mostly in children, are caused annually by the bovine tubercle bacillus, and that at least 4,000 new cases develop each year. While there is no certain evidence that bovine bacilli change into human bacilli during residence in human tissues, there is, on the other hand, plenty of evidence that these bacilli can retain their characteristic properties during the whole course of a case of tuberculosis. The situation is sufficiently serious to demand the greatest efforts to prevent the grave loss through death and disease from this cause and to bring about the eventual extinction of bovine tuberculosis, not only for economic and agricultural reasons, but also in the interests of human health.—*Observations on the Bovine Tubercle Bacillus in Human Tuberculosis, A. S. Griffith, Brit. M. J., September 10, 1932, no. 3740, 501.*—(*M. E. P.*)

Bovine Bacillus in Human Tuberculosis.—It has been possible since Robert Koch's work to confirm thoroughly his opinion that bovine tubercle bacilli can be definitely distinguished from human bacilli and that the characteristics of the bovine type are essentially constant. In a survey made in Germany there were found 8.4 per cent of bovine infections in 201 cases of generalized tuberculosis and tuberculous meningitis; 4.6 per cent in 87 cases of tuberculosis of the bones and joints; 22.3 per cent in 94 cases of tuberculosis of the cervical lymph nodes; 35.8 per cent in 106 cases of abdominal tuberculosis; no bovine infection in 24 cases of genitourinary tuberculosis; and 21.3 per cent in 160 cases of lupus. In 345 cases of pulmonary tuberculosis somewhat more than 1 per cent of cases of bovine-bacillus origin were found. In 40 cases of pulmonary tuberculosis among milkers and stable boys, bovine tubercle bacilli were found in 20 per cent. The menace of bovine infection is much greater in children than in adults. Although one must agree with Koch in his demand that the battle against tuberculosis be concentrated primarily against infection from man to man, in view of the much lower frequency of bovine infection, the widespread opinion still existing to-day that infection with bovine bacilli is comparatively harmless for mankind must be rejected as having no foundation in fact. There is every reason to employ all the means at our command to combat this source of human tuberculosis, especially as we are able to institute much more effective measures against the transmission of bovine tubercle bacilli than are at our disposal for the prevention of tuberculous infection from man to man. The theory that a light bovine infection in childhood protects the individual from later infection is a dangerous one, because no one can predict the outcome of even a slight infection in later years. The combat against bovine tuberculosis in Germany consists of periodic examination of cows with extermination of the diseased animals, inspection of milk, and the use of pasteurized milk.—*The Rôle Played by Bovine Tubercle Bacilli in Human Tuberculosis, B. Lange, Brit. M. J., September 10, 1932, no. 3740, 503.*—(*M. E. P.*)

Bovine Bacillus in Human Tuberculosis.—The bovine tubercle bacillus may produce crippling and death in human beings, especially children. The chief sources of human infection are milk and meat. Since meat is usually cooked, infection from it may be ignored. Only a small proportion of cows with positive tuberculin reactions secrete milk containing living tubercle bacilli. Veterinary inspection of cows during the years 1928–1931 in the West Riding of Yorkshire, which is a representative area for England, disclosed tuberculous udders in an average of 0.24 per cent of the 362,677 cows giving milk. The average for the 34,697 dry cows examined was 0.2 per cent. The mixing of milk from one or several farms greatly increases the proportion of infected milk sold compared with the cows actually giving it. In the first six months of 1931, 302 samples of milk produced in the West Riding were examined, and tubercle bacilli were found in only 3.3 per cent. The samples did not include Certified, Grade-A, or pasteurized milk. Though it is possible for cows to excrete tubercle bacilli in their milk for from two to ten weeks without showing suspicious signs of disease, it is uncommon. In the West Riding, during the past four years, as the result of the finding of tubercle bacilli in bulk samples of milk, 93 cows with tuberculosis of the udder were found. Of these, 82 or 88.2 per cent, showed sufficient signs of disease to allow a clinical diagnosis on the first visit. The 11.8 per cent showing no signs were found only by group sampling and then individually sampling the cows of the positive groups. The excretion of tubercle bacilli in milk may be intermittent. Microscopical examination of milk is more reliable for finding tubercle bacilli than

biological tests. Three suggestions are made, as follows: (1) the use of Certified and Grade-A milk should be encouraged; (2) milk should be produced from cows under careful veterinary supervision; (3) pasteurized milk should be used when the source of supply can not be controlled.—*Bovine Tuberculosis and Human Infection, D. S. Rabagliati, Brit. J. Tuberc., October, 1931, xxv, 162.*—(*R. M. F.*)

Tuberculosis and Heredity.—It can hardly be denied that a definite hereditary transmission of physical peculiarity occurs in the case of various allergic diseases, such as migraine, urticaria, and the different forms of the asthmatic syndrome. Here there arises neither a question of infection *in utero* nor of exogenous infection, except possibly as an end-factor which may determine the precipitance of an attack, but of a certain instability of a neuromuscular mechanism of the body which is essentially a characteristic handed on by the patient's progenitors. The possibility of analogy between the case of such allergies and that of certain acute types of tuberculosis is suggested. The influence of hereditary traits as a determining factor is also to be considered in the subsequent development of phthisis to explain why some patients do well by whatever regimen they are treated, while others go progressively downhill in spite of the best possible treatment. Whatever may be the biological factors which underlie the essential differences between these types, it can hardly be doubted, in the face of clinical experience, that such factors are present, and that they determine the physical make-up which constitutes the patient's individuality. The opinion is expressed that the inheritance on the part of phthisical patients of a physical make-up which renders their immunity to tuberculosis less than that of other more fortunate individuals is a probability which gains a good deal of support from a study of the behavior of the disease in all its practical aspects.—*Tuberculosis and Heredity, M. Davidson, Brit. J. Tuberc., October, 1932, xxvi, 196.*—(*E. H. K.*)

Marital Tuberculosis.—In contrast to the older authorities, who found a 4 per cent incidence of tuberculosis in married partners of tuberculosis patients, Ward has recently compiled figures which show 58 per cent of definite tuberculosis and 10 per cent of suspects among 156 married partners. Verco has shown that, in respect to conjugal infection, women appear to be 3 or 4 times as susceptible as men. Since all individuals in civilized countries are infected with the tubercle bacillus and rendered allergic in the first few years of life an immunity is obtained which protects most of them from ordinary exposure. Married persons are no exception to this rule, but if one of the partners has advanced disease the risk of massive doses of tubercle bacilli and consequent exogenous reinfection in the consort are increased. If precautions are observed there does not appear to be more risk to the married partner than to any one else in frequent contact with tuberculous patients.—*Marital Tuberculosis, M. Davidson, Brit. J. Tuberc., April, 1932, xxvi, 80.*—(*R. D.*)

Tuberculosis and Pregnancy.—It is accepted that pregnancy makes tuberculosis worse. Certain hypotheses, suggested as reasons for this, are as follows: *1:* Decreased lipolytic activity of the blood causes difficulty in dissolving the fatty capsules of the bacilli. *2:* The tubercle bacilli thrive on the increased cholesterol in the blood. *3:* Progressive decalcification causes increased liberation of bacilli. *4:* There is increased strain due to disturbance of the equilibrium of internal secretions. *5:* The positive tuberculin skin reaction is lessened in pregnancy and increased after labor, possibly because of the presence of tubercle bacilli in the placenta in the latter months of pregnancy. Statistics show that 50 to 85 per cent of patients are made worse, 15 to 19 per cent better or unchanged by pregnancy, and that 20 to 30 per cent of mild or quiescent cases and 70 to 90 per cent of more advanced cases show an exacerbation during pregnancy or the puerperium. Also, the disease was adversely affected in 44 per cent of patients becoming pregnant before a cure was attained. The prognosis is good with pleurisy, more favorable with the fibrous than with the fibrocaseous type, and fatal with meningitis or laryngitis. The prognosis improves in proportion to the duration of healing in both tuberculosis of bone and of the lungs. Transplacental infection of the child is rare, but has been reported. Children of tuberculous parents are seven times as likely to become tuberculous as those of healthy parents. That 27 to 50 per cent of the former group die within a year after birth may be due not only to tubercle but to artificial feeding and poor social conditions. The child of a cured tuberculosis patient has little greater handicap than that of a healthy patient. Careful hygiene and regular examination of the lungs suffice for the successful conduct of pregnancy in the patient with cured disease. In cases of active disease the tuberculosis is treated first and the pregnancy as a

complication. All pregnant persons should be obliged to consult a physician early in pregnancy and again later. Therapeutic abortion has no place in healed or very advanced cases. Its use is best restricted to the first three months of pregnancy and to three types of cases, as follows: (1) early, active disease; (2) very recently arrested disease; and (3) arrested cases recently become active. Avoidance of haemorrhage, shock, sepsis and long or unsuitable methods of anaesthesia is imperative. Dilatation and curettage under ether anaesthesia is probably worse than allowing pregnancy to continue. Slow methods are preferred. The introduction of laminaria tents into the cervix and a catheter containing sterile glycerin into the uterus can often be done without anaesthesia and is usually successful within thirty-six hours. Abortion should be done only if treatment of the tuberculosis is to be continued. Induction of labor, except for obstetrical complications, has no place in the treatment of tuberculosis. During labor, pain should be relieved and strain lessened by application of forceps. Nitrous oxide and oxygen is preferred for anaesthesia. Sanatorium treatment should be advised as soon as the obstetrical condition allows. There is no contraindication to lactation in cured tuberculosis. It is forbidden by most physicians in case of active disease. If the mother's sputum is positive the child should be isolated. Sterilization of the tuberculous is justified only under exceptional circumstances. Marriage can be advised only after cure, and pregnancy should not be risked until at least two years after complete cure and cessation of symptoms. Tuberculosis in one or both consorts appears to increase the fertility rate. The mortality rate of pregnant tuberculous patients corresponds not with the general maternal mortality rate, but with the rate for tuberculous women, which is highest between twenty and forty years of age.—*Tuberculosis and Pregnancy, M. Salmond, Brit. J. Tuberc., October, 1931, xxv, 179.*—(*R. M. F.*)

Adult Phthisis from Exacerbation of Primary Focus.—A case is reported which demonstrates the development of acute pulmonary tuberculosis in an adult from a lesion which had been observed when the child was three years of age. With the exception of rare cases, when a late primary infection undoubtedly takes place, phthisis in adults is invariably preceded by an early childhood infection. The question, however, is still open, whether pulmonary tuberculosis in later life is due to an exacerbation of minute intrapulmonary foci, which originated during childhood or to exogenous or endogenous reinfection. Hamburger himself had years ago advanced the theory that apical foci due to early reinfection do not heal readily and completely and may exacerbate after many years if the resistance of the patient is lowered. The case which is reported supports Dietl's views that phthisis in the older child or adult is sometimes caused by exacerbation of the primary focus or the primary infiltrate. In a child at the age of three an acute infiltration of the left upper lobe was observed in 1914. The acute symptoms subsided within two weeks, the child made an uneventful recovery and had apparently been in splendid health since then. Bronchial breathing and impaired resonance were always noted over the left upper region. After nineteen years the patient in 1932 became acutely ill and physical and radiological examination revealed a dense infiltration of the same lobe. The sputum was strongly positive.—*Ein Fall von Erwachsenen-Phthise durch Exazerbation des Primaerherdes, F. Hamburger, Wien. klin. Wchnschr., September 23, 1932, xlv, 1175.*—(*K. F.*)

Childhood Infection and Tuberculosis in Adults.—While it is generally agreed that progressive pulmonary tuberculosis in adults starts usually with an infiltrative focus, the relation of such clinically initial foci to previous infections, old or recent, is still much under discussion. In other words, the old question whether exogenous or endogenous reinfection is the important factor in phthisiogenesis has not been solved by a better understanding of the morphological genesis of adult phthisis. A total of 460 patients with open pulmonary tuberculosis was divided into two groups according to the absence or presence of demonstrable lime deposits within their lesions. The group with lime deposits, 200 patients, was assumed to represent exacerbations of childhood infections. By 17.5 per cent of these patients, concretions had been expectorated. In 54.5 per cent the history revealed a definite source of infection, usually in the family, in childhood. This, by nature, represents a minimal figure. Postpuberty sources of infection were discernible in only 4 per cent of this group. The history revealed in the majority of these patients those factors which are commonly thought to reduce resistance, such as intercurrent disease, undue strain, operations, enforced diets and so on. The second group of 260 patients showed no lime deposits in the pulmonary foci. A source of infection, immediately preceding the clinical disease, was revealed in 45.4 per cent, while a child-

hood infection was likely in but 2 per cent. Within this group of 260 patients there were 59 with the typical picture of an early infiltration; of these 41, or 69 per cent, knew of a definite source for a massive infection, shortly preceding their breakdown. These figures suggest that more than half of these patients suffered from the late consequences of a massive childhood infection, and that in about 25 per cent of the patients, a massive source of infection after puberty caused the disease, probably a true exogenous reinfection. Massive childhood infection seems to predispose to later endogenous reinfections, but to protect against exogenous superinfections, while mild childhood infections lack both the predisposing and the protecting factors.—*Klinische Beiträge zur Frage der Genese infiltrativer Lungenerkrankungen und des Zusammenhanges zwischen Kindheitsinfektion und Erwachsenenphthise, H. Adler, Beitr. z. Klin. d. Tuberk., May, 1932, lxxx, 22.*—(*M. P.*)

Tuberculosis in Childhood.—The records of the London County Council for 1930 show that of 4,189 tuberculosis patients, some nonpulmonary, only 25 were known to have received treatment for tuberculosis in childhood, and of these 11 were sputum-positive at that time. Looked at from another angle the children who were "sputum-negative" and discharged from treatment in 1924 showed 92.9 per cent alive and well 5 years later, while there were only 15 per cent of the sputum-positive cases surviving. These figures indicate that tuberculosis in adult life occurs, for all practical purposes, *de novo*. A study of childhood tuberculosis will apparently be of little help in the problem of adult tuberculosis. The sputum-positive cases in childhood are, however, very grave and any measure to detect them earlier will be valuable. There were in London in 1930 but 95 deaths from pulmonary tuberculosis in children up to 16 years of age. The group is not a large one. A survey of 48 consecutive cases was made. There were 75 per cent females, and the question is raised whether closer contact with members of the family and less outdoor activities may not be factors. As regards age, 64 per cent were between 14 and 16; in other words beyond the average school age for London. Onset was apparently sudden, undernutrition was not an evident factor, the diagnosis was usually made within eight weeks, but the disease was usually moderately or far advanced. The relative infrequency of these cases is one of the difficulties in the way of diagnosis. It does not seem feasible to X-ray all school children, and practical attention is turned to contacts. A total of 121 cases was studied for contacts, and it was found that in 44 per cent there was some history of tuberculosis in the household. A statistical study showed that 3.7 per cent of normal school children have in the family a living notified case of pulmonary tuberculosis, while 14 per cent of the sputum-positive children showed a similar history; also, that 5.9 per cent of normal children have a case of notified pulmonary tuberculosis alive in the family or one dead within the preceding five years, while 28.9 per cent of sputum-positive children show similar contact with the disease. In connection with the problem of investigating the contacts it is noted that the incidence curve of tuberculosis rises sharply between 14 and 20, and that in London the children usually leave school at 14. The American studies covering children that remain in school to 16 and often to 18 are therefore not entirely applicable. The intensive "American" methods would be most profitably applied to the group of girl contacts, aged 14, who were leaving school, but would probably "discover" about 15 of the 60 cases to be expected for the year. The investigation would hardly appear to be one for the health authorities. The study of the contacts as a matter of research might well be fruitful in revealing factors of importance.—*Pulmonary Tuberculosis in Childhood, F. J. Bentley, Lancet, March 26, 1932, ccxxii, 689.*—(*R. D.*)

X-ray Findings in School Children.—Systematic roentgen examination of a total of 288 children from tuberculous surroundings revealed an infection frequency (primary complex) in 13 per cent, while nonexposed children showed only 9.1 per cent. There were 2 cases of active pulmonary tuberculosis and one of tracheobronchial lymph-node disease.—*Röntgenreihenuntersuchungen Schulentlassener, J. W. Samson and Bertha Heinrich, Zeitschr. f. Tuberk., 1931, lix, 414.*—(*H. J. C.*)

Pulmonary Tuberculosis in Childhood and Bronchiectasis.—The relations between haematogenous pulmonary tuberculosis and the development of bronchiectases in children, are hardly mentioned in the literature. Haematogenous foci, even when they are so numerous that they come close to simulate miliary tuberculosis, may undergo sufficiently complete healing that it is impossible, at a later date, to diagnose the past occurrences. The subjective symptoms are frequently so slight that they are not brought to medical attention. Many such lesions are found incidentally and many are likely never to come up for diagnosis. In

the reparative phases, the formation of scar-tissue and indurations may cause the development of bronchiectases. It is difficult to establish the causal relation, because, at a time when bronchiectatic processes are diagnosable, the preceding specific lesions are usually not easily recognizable any more. The pathological picture, which dense haematogenous foci may leave as more or less healed residua, is the one that has been described by Hansemann as *lymphangitis reticularis chronica*. Roentgenologically, such cases show net-like markings throughout the lung fields, with small nodular shadows, usually at points where linear markings cross. The roentgenological picture resembles closely those in carcinomatous lymphangitis and in chronic interstitial pulmonary syphilis. Clinically, heart failure is often the predominant problem, since the interstitial indurations have impaired a large proportion of the vascular bed in the lungs. In the pathogenesis of bronchiectasis, the frequent involvement of endo- and peribronchial tissue produces weakening of the bronchial wall, which, in conjunction with the diffuse parenchymal fibrosis, results in bronchial dilatation. Actual tension from scars can become effective only when pleural adhesions are present. But bronchiectases are not only the results of directly dilating forces; they develop secondarily when stenosis or distortion of bronchi has impaired the air circulation or the secretory functions. Four patients are presented in some detail in whom the development from haematogenous pulmonary foci to bronchiectasis has been observed, or been reconstructed.—*Die Bedeutung der hämatogenen Lungentuberkulose für die Entstehung bronchiektatischer Veränderungen im Kindesalter, zugleich ein Beitrag zur Differentialdiagnose zwischen sekundärer Tuberkulose und dem Krankheitsbild der Bronchiektasie, H. U. Köttgen, Beitr. z. Klin. d. Tuberk., May, 1932, lxxx, 1.*—(*M. P.*)

Detection of Presymptomatic Tuberculosis in Children.—Early recognition of tuberculosis in childhood depends on radiology and tuberculin testing. A survey was made of 50 children, between the ages of 5 and 12, who had been patients at the Marylebone Dispensary but were considered normal by their parents. X-ray films showed 4 cases of "latent" tuberculosis, 4 of enlarged lymph nodes of the tracheobronchial group, and 5 of nontuberculous fibrosis. The intracutaneous tuberculin test was positive in 3 and negative in 1 of the 4 "latent-tuberculosis" cases, and positive in 2 and negative in 1 of the 3 cases of enlarged lymph nodes which were tested. The test was done with Burroughs and Wellcome O. T., using successive doses, 0.1 cc. of 1: 10,000, 1:1000 and 1:100. The larger doses were utilized only when the weaker dose had given negative findings. As far as is possible from such a small number of cases, one concludes that the tuberculin test is an inadequate guide in the cases studied. So far as could be learned no case of tuberculosis developed from contact with an open case. Apparently there is a large amount of accidental tuberculosis. Clinical examination and the tuberculin test are not altogether reliable guides to the presence of "latent" tuberculosis in children.—*The Detection of Presymptomatic Tuberculosis in Children, E. Fletcher, Lancet, February 27, 1932, ccxxii, 444.*—(*R. D.*)

Chronic Miliary Tuberculosis.—With the help of the X-ray it may be demonstrated that miliary tuberculosis of the lungs, although usually an acute condition terminating fatally, may take the form of a low-grade chronic process with a good prognosis. Two cases in children (2½ and 6 years of age) are reviewed in this article, both patients showing clinical improvement and regression of the radiographic findings in the lungs after several months of hygienic treatment.—*Tuberculose miliare chronique, J. Comby, Arch. de Méd. d. Enf., July, 1932, xxxv, 413.*—(*M. D.*)

Chronic Miliary Tuberculosis in Child.—In a boy, six years old, a chronic miliary tuberculosis of the lung, occurring in repeated spreads was observed which finally cleared, but produced as end-result diffuse cylindrical bronchiectasis.—*Beitrag zum Verlauf der chronischen Miliartuberkulose im Kindesalter, H. Rennebaum, Beitr. z. Klin. d. Tuberk., August, 1932, lxxx, 500.*—(*M. P.*).

Erythema Nodosum.—Attacks of erythema nodosum occurred within a period of 2½ weeks in 4 of 12 children (convalescing from pertussis) in one ward. The affected patients, aged 1 to 5 years, all had positive intracutaneous reactions (0.0,001 mgm.), as well as radiographic evidence suggestive of some degree of hilar affection. The entire ward had been exposed for 5 weeks to a patient with pertussis and bronchopneumonia who died of miliary tuberculosis 8 days before the first case of erythema nodosum arose. The 4 children all had sore throats of varying degrees and positive Dick tests at the onset of the rash. However, streptococci were obtained from the throats in only 2 instances, and the injection of streptococcal antitoxin into a fresh lesion failed to produce blanching in the 2 children in whom this

procedure was done. The outbreak of erythema nodosum was therefore considered as of the same nature as those investigated by Landau,—an allergic manifestation of recent tuberculous infection.—*A Ward Outbreak of Erythema Nodosum, N. D. Begg, Brit. J. of Child. Dis., July–September, 1932, xxix, 193.—(M. D.)*

Erythema Nodosum.—Four girls, 11 to 12 years of age, members of one class at school, developed erythema nodosum simultaneously. All had positive tuberculin reactions and radiographic evidence of fresh hilum-node enlargement. Examination of the other 27 members of the class, all girls of the same age-group, revealed that all but 2 had positive tuberculin reactions. Among these 27 children 4 had evidence of recent hilum-node enlargement and one had active pulmonary tuberculosis with cavitation as well as acid-fast bacilli in the sputum. It is interesting to note that this child had had a "cold" with considerable coughing about 4 to 6 weeks before the appearance of the erythema nodosum in the 4 girls reported. Presumably these 4 children were infected at that time. The subsequent development of erythema nodosum is in conformity with the theory that this condition is a parallergic phenomenon which occurs at the end of the incubation period of tuberculosis, when the body is in an allergic condition. A number of "epidemics" of erythema nodosum among groups of children have been reported, and of those investigated by the author and by Wallgren (1927) a source of tuberculous infection was found in every instance. It must be emphasized that a child with bronchial-node tuberculosis alone may act as such a source. —*Multiple Cases of Erythema Nodosum in a Class of School Children, Landau, Arch. Dis. Child., April, 1932, vii, 77.—(M. D.)*

Eradication of Bovine Tuberculosis in Man.—It is established beyond doubt that human beings can be infected by bovine tubercle bacilli, and that such infection increases with the frequency of bovine tuberculosis in the respective countries. In the North of Germany 60 to 86 per cent of all cows are infected. Since milk is frequently fed to hogs, the latter often contract tuberculosis and constitute, in their turn, a possible source of human infection. The infection can be transmitted through infected meat, through infected milk, by contact infection in meat-handlers and by droplet inhalation from cattle with open tuberculosis. The first mode of infection is of small practical importance since the meat is rarely heavily infected. The milk, however, is a real danger, especially for children. In some of the important European cities 2 to 61 per cent of milk samples have been found contaminated with tubercle bacilli. Dairy products, such as milk, butter and cheese, are frequently contaminated. Wherever the milk supply is not perfectly safe pasteurization alone should not be relied upon, particularly not if the milk is to be fed to infants. Bovine tuberculosis can be successfully eradicated, as has been shown in practical work, in two different ways. In countries where bovine tuberculosis is not very frequent and where financial resources are great, such as in the United States, the tuberculosis eradication program as used in that country can be highly recommended. In other countries, where bovine tuberculosis is very frequent and financial resources are relatively small, the Bang method is successful. In this method the herds are tested with tuberculin at regular intervals and the reactors are separated from the nonreactors. Calves born from reacting cows are immediately removed to uninfected surroundings. By continuous segregation of reacting and nonreacting cattle, it is possible to reduce the frequency of tuberculosis to a minimum.—*Die Verhütung der Uebertragung der Tuberkulose des Rindes und Schweines auf den Menschen, K. Diernhofer, Wien. Klin. Wchnschr., June 24, 1932, xlv, 820.—(M. P).*

Eradication of Bovine Tuberculosis.—Considerable legislation which facilitates state and federal coöperative area-testing has been enacted during the last year. States have appropriated $14,000,000 and the federal government $6,500,000 for this work, including the indemnity which follows detection of infection and destruction of the reactors. During the fifteen year period ending in 1908, 400,000 tests were made on cattle, 10 per cent of which were found to be reactors. During the year of 1931, over 13,000,000 tests were applied which revealed an incidence of 1.5 per cent infection. At present approximately 1,000,000 tests are being made each month. There are now modified accredited areas in all but eight states in this country. Ohio and Wisconsin have been admitted to the still small group of states that are accredited. There are now 160,415 herds (2,595,962 cattle) that are accredited. Very little reinfection creeps into accredited herds. There is not much tuberculosis among cattle assembled for shipment and most of these reactors originate in parts of the country where there is little tuberculosis and thus little supervision. Due to the depressed value of cattle, the indemnity fees have been lowered from

$35.00 to $25.00 for grade cattle and from $70.00 to $50.00 for pure-bred cattle. The situation with respect to avian tuberculosis continues to improve, but this is still a serious problem. The incidence of tuberculosis in cattle and swine is steadily decreasing. During the year ending June 30, 1931, 88,000 hog carcasses were destroyed because of tuberculosis, which represents an incidence that is only one-half as great as that ten years earlier. The 12,500 cattle (carcasses) condemned during this same year would have been trebled ten years ago, but for the marked reduction in the incidence of the disease. Federal and state officials are coöperating with owners of live-stock in a concerted effort to combat Johne's disease or paratuberculosis of cattle. Fortunately, the disease is serious in only a few localities.—*Progress of Coöperative Tuberculosis Eradication Work, A. E. Wight, Journ. Am. Veterin. Med. Assn., March, 1932, lxxx (n. s. xxxiii), 399.*—(*H. S. W.*)

"No-lesion" and "Skin-lesion" Tuberculin Reactors in Cattle.—The incidence is high of cattle condemned through the tuberculin test which show either no lesion or lesions confined to the skin. Of nearly half a million cattle tested in Utah during the last five years, more than 3,000 were killed as reactors. And of these reactors 32.8 per cent showed no lesion at autopsy and 59.7 per cent showed cutaneous lesions. Only 7.6 per cent revealed disease of the viscera. An unknown but surely a large proportion of the "no lesion" reactors would have revealed some sign of disease if detailed laboratory examination could have been made. It is of interest and importance to observe that (1) there has been a marked relative increase in the incidence of the no-lesion and skin-lesion reactors in recent years; (2) they have occurred in herds that have been tuberculosis-free for some time and have been without known contact with tuberculosis; (3) they react more vigorously to intracutaneous than to subcutaneous tests; and (4) the reactions are often so atypical as to suggest the diagnosis of skin-lesion tuberculosis. Bacterial studies of such skin lesions have led to the belief that the acid-fast bacillus which is occasionally found in the diseased areas (and grown on culture) is not a bovine tubercle bacillus or a mammalian tubercle bacillus. This, however, is out of accord with certain other work in which an acid-fast bacillus, pathogenic for guinea pigs and rabbits, has been found. Material from 211 animals has been studied. The lesions have been found to be predominantly subcutaneous, and to vary in size from that of a pin's head to that of a hen's egg. About one-third of them are connected with the outside world. The nodules may be made up of granulation tissue without necrosis; they may contain central necrosis with or without calcification. Microscopical examination reveals acid-fast bacilli in every typical lesion taken from reacting cattle. These are pleomorphic. Non-acid-fast bodies of corresponding shape are present. Diplococcoids predominate. The strain, of which both the pleomorphic acid-fast and non-acid-fast forms appear to be variants, grows well on ordinary, rich media and at room temperature. Cultures fall into three groups; (1) cream-colored growth appearing only after several weeks: pathogenic for guinea pigs (from one animal only); (2) dry, rough colonies nonchromogenic or varying from cream to yellow, red, and brown, the latter color apparently dependent upon the medium used: growth in twenty-four hours, bacteria usually but not always acid-fast, and becoming more so with age; and (3) deep orange, smooth, spreading colonies of very slow growth: nearly all are acid-fast and remain fixed in this respect. Most of the cultures fall in group two. Cultures from barnyard manure and soil yield acid-fast strains in many instances and these are like those of group two. Numerous types of animals have been inoculated with these strains and with the tissue of the diseased areas themselves. Strains in group two lead to abortion and diarrhoea, and the injected guinea pigs usually react to mammalian tuberculin. At death, which follows the inoculation frequently, no gross lesion is detectable. Strains in group three lead to abscess and hard, indurative lesions from which bacteria may be recovered. Pseudotuberculosis was found in the liver three times. Rabbits die from group two and three in about three weeks, with gross lesions. Chickens and mice fail to show changes. Eight cows are under observation after inoculation. Two of four that received group-two strains died after severe diarrhoea and revealed multiple abscesses over the body, containing many non-acid-fast diplococci. Cattle have been inoculated with the Preisz-Nocard bacillus, and the evidence points to marked similarity between lesions in these and those infected with groups two and three. The lesions do not resemble those of tuberculosis. The Preisz-Nocard bacillus (causing suppurative lymphadenitis in sheep) is widespread where sheep range and is carried by normal sheep. It appears likely that the strains of bacteria found in most of the skin lesions of cattle belong to this strain and were carried into the skin by trauma. This hypothesis still lacks absolute confirmation but is logical. It does

not explain the acid-fastness in which the body-fat of the animal may play a part. There is also striking similarity between the strains found and the strains Walker described as the cause of leprosy in rats. Many of these questions are being investigated.—*A Study of So-Called Skin-lesion and No-lesion Tuberculin-reacting Cattle, L. L. Daines and H. Austin, J. Am. Veterin. Med. Assn., March, 1932, lxxx (n. s. xxxiii), 414.*—(*H. S. W.*)

Control of Johne's Disease.—Johne's disease or paratuberculosis of cattle spreads slowly and is probably widespread in this country where it was introduced with imported cattle from Europe. The yearly loss in several herds in Wisconsin from this disease during the last several years has varied from 2 to 12 per cent. The incubation period may be extraordinarily long. Symptoms are rare among young, infected cattle which react to Johnin. Records reveal that a cow may harbor the infection for five and one-half years without clinical symptoms of the disease and that some may never develop the disease although they have the infection. The usual symptoms are loss of flesh and intermittent diarrhoea in animals that eat well and appear normal otherwise. The characteristic lesion is thickening of the intestinal wall. No pathological proof of healing exists. The causative bacterium is a very small acid-fast bacillus. Intensive work (testing the herd and killing the reactors) has demonstrated, in a herd known to have been infected for fourteen years, that the disease is extremely difficult to eradicate. At present the only satisfactory method of eradication seems to be the expensive (and perhaps impossible) one of killing the entire herd in which the infection is present in more than a slight degree. Short of this, removal of animals which react to Johnin will undoubtedly serve to lessen the incidence of the infection. But the slow, insidious character of the disease makes it appear unlikely that the method will be adequate. Any animal from an infected herd is a potential source of the disease, if it is introduced into another herd. —*Problems in Controlling and Eradicating Johne's Disease, V. S. Larson, B. A. Beach and W. Wisnicky, Journ. Am. Veterin. Med. Assn., March, 1932, lxxx (n. s. xxxiii), 446.*—(*H. S. W.*)

Control of Avian Tuberculosis.—The association between tuberculosis in cattle and swine and poultry is more than incidental, although it is only during the last decade that much attention has been paid to the latter. From 1922 to the end of 1931, field veterinarians in Michigan have uncovered 14,815 infected flocks out of 291,344 flocks which they have examined in the course of their regular inspection of cattle. This has been done at very little additional cost. Study which has been made of the association or incidence relation between bovine and avian tuberculosis reveals the fact that from a certain county 46,368 hogs were shipped, of which 9,105, or 19.52 per cent, were found to be tuberculous. Many of the latter were found to have come from 39 farms, 13 of which still had hogs upon them. These remaining animals (214 hogs) were then tested with avian and with standard tuberculin. Seventeen per cent (37 hogs) reacted, 31 of them to avian tuberculin, only five to both, and one to the standard only. All of the flocks on the farms having the hogs that reacted to avian tuberculin were found to be tuberculous, either by test or autopsy. Experience in eradication of avian tuberculosis demonstrates clearly (1) that the disease cannot be eliminated from flocks by culling because many diseased fowls do not appear ill and (2) that by far the larger number of fowls with generalized tuberculosis are over one year old. Of 25 flocks under special observation, physical examination showed infection in 12 per cent and tuberculin test revealed it in 52 per cent. Testing of swine with both bovine and avian tuberculin gives an excellent guide as to the incidence of tuberculosis among fowls on the farms where test occurred. Poultry raisers are now being advised to sell off their entire flocks annually and build a new one each year from young chicks. This not only eliminates tuberculosis completely but it reduces other diseases by 75 per cent, it yields more eggs since hens are better layers the first year than later, and it brings a better market price. Of 60 flocks in one township, all of them known to have been infected previously, 48 were being rebuilt annually and were entirely free from tuberculosis. Reinspection of 332 flocks in two townships in which the scheme advocated had been employed revealed that only ten were still infected. Field inspection, testing and tattooing of hogs have located many areas in which avian tuberculosis has been rife and have shown in recent years a definitely downward trend in the incidence of avian tuberculosis.—*The Control of Avian Tuberculosis, T. S. Rich, Journ. Am. Veterin. Med. Assn., March, 1932, lxxx (n. s. xxxiii), 386.*—(*H. S. W.*)

Resistance of Chickens Sensitized with Avian Tubercle Bacilli.—A survey by J. R. Mohler in the United States in 1927 showed that approximately 5.7 per cent of

the fowls in an area of 34 states were infected with tuberculosis. What rôle avian tubercle bacilli play in the epidemiology of human disease is not yet clear. The avian organism has been isolated from human beings, although rarely. There is no proof that the avian organism may change into the human or bovine type. Nevertheless, the organism must be taken into consideration as a possible epidemiological factor in any campaign against tuberculosis in man. The infection may enter the body either through eggs (raw or partially cooked) which contain the bacilli or through partially cooked chickens. The eradication of avian tuberculosis must be advised not only for epidemiological reasons, but also as an actual practical economic factor. To check the spread of the disease, an attempt has been made to eliminate the fowls reacting to tuberculin. This method has been moderately successful. The hope of building up resistance to tuberculosis in fowls by some method of vaccination must not be neglected. In this paper experiments in which heat-killed and living avirulent organisms were used to produce tuberculin hypersensitiveness in chickens are described. For this purpose two types of organisms having a definite topography and difference in virulence were used. These types were dissociated from the A1 strain of avian tubercle bacillus. The *S* colony was smooth, round, moist, like a moth-ball, easily emulsified and highly pathogenic for chickens. Conversely, the second type, *R*, was rough, dry, difficult to emulsify and possessed only slight virulence. Only cultures having typical *R* and *S* colony characteristics were used. The colonies were suspended in physiological salt solution, transferred to ampules and sterilized in a water-bath at 100°C. for half an hour. Two hundred and sixty young white Leghorn roosters were selected for the experiment. All gave negative tuberculin reactions. These chickens were divided into five groups, each group consisting of approximately 50 chickens. Group I received three 2.5-mgm. doses of heat-killed *S* organisms intramuscularly. Group II received the same amount of heat-killed *R* organisms; Group III the same amount of heat-killed original undissociated avian tubercle bacilli (A1) and Group IV received three doses of living *R* organisms, approximately 5,000,000. Group V served as a control. Thirty days after the beginning all the inoculated groups were tested with avian tuberculin. For the test, a 50 per cent dilution was used and the injection was always made into one of the wattles. Chickens sensitized with *R* heat-killed (II) gave the most intensive reaction; 86 per cent strong, 12 per cent weak and 2 per cent negative. Of those sensitized with the undissociated culture (III) 85.6 per cent gave a strong reaction and 14 per cent weak, and of those sensitized with *S* (I) 71.5 per cent gave a strong reaction, 26.1 per cent weak, and 2.4 per cent no reaction. Of those sensitized with living *R* (IV), 65.1 per cent gave a strong reaction, 32.5 per cent weak and 2.4 per cent no reaction. After the tuberculin test the five groups received living virulent *S* avian cultures to test the degree of the resistance. As the portal of entry of spontaneous disease is, in all probability, the mouth in most cases of avian tuberculosis, an attempt was made to infect the chickens by feeding them with food which contained tubercle bacilli (virulent *S* avian bacilli). Seventy-one days later the chickens were retested with tuberculin. As 43 of the controls gave a negative reaction it was plain that progressive disease had not been established, and another method of infection was attempted. The five groups of chickens were then inoculated intravenously (into the wing veins) with 0.01 mgm. of virulent *S* avian tubercle bacilli. The same controls were used, as it appeared that not more than 3 had been infected by feeding. During the course of the experiment a number of chickens died of intercurrent diseases. At the end of the experiment which covered a period of 554 days, only 213 of 260 chickens came up for final analysis. The other 47 either died too early to be included or had lost their tags and were discarded. Detailed results are given in tabular form. In these tables are mentioned the results of the tuberculin tests, the days of life, the degree and location of the tuberculosis present and the cause of death. The vaccinated chickens showed less disease than the controls and the greatest degree of protection was demonstrated in the group of chickens vaccinated with heat-killed *S* organisms. In this group 28 out of 48 fowls were free from tuberculosis. Unfortunately 8 out of 42 controls were also free from disease. Possibly the first attempt to give the controls an enteric infection resulted in a subsequent resistance against the intravenous infection. Histological examination revealed greater calcification and healing in the vaccinated fowls than in the controls. This was especially true of the group vaccinated with heat-killed *S* organisms. It is to be noted that this group showed a lessened tuberculin hypersensitiveness on the retest. The above experiments suggest the possibility of vaccinating fowls against avian tuberculosis.—*Immunological Studies in Tuberculosis. VII. Resistance of Chickens Sensitized with Heat-Killed and*

Living Avian Tubercle Bacilli, S. A. Petroff, W. Steenken, Jr., and W. A. Urin, J. Immunol., June, 1932, xxii, 413.—(J. S. W.)

Tuberculosis of Turkeys.—Tuberculosis affects turkeys that are confined but rarely those which range. The incidence of infection increases with age but is not as great as that among chickens. Symptoms are slight until late. The disease involves chiefly the abdominal viscera, as it does in chickens. The lungs and thymus are diseased in about one-third of the cases. The tuberculin test is much more reliable when given in the wing web than when given in the wattle.—*Studies on Tuberculosis of Turkeys, W. R. Hinshaw, K. W. Niemann and W. H. Busic, J. Am. Veterin. Med. Assn., May, 1932, lxxx (n. s. xxxiii), 765.—(H. S. W.)*

Late Primary Affects in Adults.—Among 4,000 cases of all ages there were only 36 (0.9 per cent) of tuberculous later primary affects in the adult, and the majority occurred between the ages of 20 and 25 years. In 72 per cent of these, the complex was found in the lungs, and in 28 per cent extrapulmonarily in the ileum. The latter localization was relatively more frequent than in childhood. Mostly a primary affect occurred only in the lungs; rarely double primary affects were found in both lungs. Both upper lobes are the preferred site, and, as in the child, the lesions are mostly subpleural. In the adult there is also a definite tendency toward healing; more rarely disease progresses. In intestinal infection the primary focus can heal, or it can exist as a primary ileocaecal tumor or heal with clinical symptoms of stenosis. In spreading there can develop typical enlarged lymph nodes with tabes mesenterica. Finally, in both types of cases there can occur haematogenous dissemination and miliary seeding. In this case there was lacking an isolated organ phthisis.—*Über den tuberkulösen Spätprimäraffekt des Erwachsenen, E. Ragnotti, Beitr. z. Klin. d. Tuberk., 1931, lxxvi, 459.—(H. J. C.)*

Miliary Pulmonary Tuberculosis.—On the basis of three detailed case reports it is pointed out that miliary seedings of the lungs occur which produce very little symptomatology and which may heal either by resorption or by calcification. It is assumed that these propagations take their origin most frequently from tuberculosis of the mediastinal lymph nodes. Exogenous reinfection may act as a stimulus to such seedings without being its direct cause. The clinical and roentgenological pictures produced by these processes have been described by Bard as *granulie discrète*, and by Neumann as *Tuberculosis miliaris discreta.—Zur Genese der miliaren Lungenstreuung, H. Edel, Beitr. z. Klin. d. Tuberk., September, 1932, lxxx, 599.—(M. P.)*

Argentophilic Fibres in Miliary Tuberculosis.—Argentophilic (reticulum) fibres resist caseation, and are therefore structural elements which may indicate, even in far-developed lesions, previous processes. In caseated foci, both normally existing and new-formed argentophilic fibres are demonstrable. Miliary tubercles from 39 children were examined, and it was found that they belonged in five different groups. The first group is characterized by the fact that the tubercles are not granulomata, but miliary necroses which are surrounded by inflammatory changes, *foyer d'alvéolite macrophagique* of the French authors. In such foci the reticulum fibres of the normal structures are well preserved, while some of the elastic fibres may be destroyed. Productive processes are lacking. In the second group, the necrotic centres are surrounded by thin layers of epithelioid and giant cells, between which new-formed reticulum fibres are present. The tubercles of the third group are essentially similar to those of the second, but there is a definite increase in the normally present reticulum fibres, which are adjacent to necrotic lesions. These fibres grow into the caseated tissue. Clinically, the third group is represented by a more chronic course than in the first two groups. In the fourth group the tubercle show exacerbation with secondary leucocytosis and caseation. New-formed reticulum fibres are seen in the peripheral parts, while the centres show only preformed fibres. The fifth group shows only differences in organic distribution, but is otherwise similar to the fourth. There are, in all groups, marked differences in the histological characters according to different organs. The essential conclusions are that all miliary tubercles start with an exudative necrotising reaction, and that the productive phases are secondary.—*Zur pathologischen Histologie der Miliartuberkulose auf Grund einer Untersuchung der argentophilen Fasern, M. B. Ariel, Beitr. z. Klin. d. Tuberk., May, 1932, lxxx, 100.—(M. P.)*

Pathology of Acute Pulmonary Tuberculosis.—A 31-year-old man, complaining of abdominal pain, diarrhoea, loss of appetite and weight, and fatigue, of increasing severity, was hospitalized with a tentative diagnosis of typhoid fever. Roentgenograms of the chest revealed, however, widely disseminated throughout both lungs, small

granular shadows with intervening normal-appearing fields. On postmortem examination, ten days later, both lungs were found studded with translucent miliary tubercles. In addition there was a small cavity with smooth walls, but without an investing fibrous capsule, in the apex of the right lung. The spleen, but not the liver, kidneys, or meninges, contained many of these nodules. Microscopically these areas were found to be diffuse caseous infiltrations without any evidence of encapsulation. No nodules containing giant cells were found in the lung, although there were numerous ones in the spleen, and special stains revealed no collagen transformation of the fibrous structures. These observations confirm the findings of Rist and his school that miliary forms of tuberculous lesions, clinically interpreted as nodular tuberculosis (*granulie*), are more often focal exudations than follicular interstitial proliferations. It is suggested that this case represents an initial phase in the evolution of an acute caseous bronchopneumonia, the *infiltration grise* of Laennec.—*Épisode miliaire évolutif au cours de la tuberculose pulmonaire aiguë, C. Roubier and S. Doubrow, Rev. d. l.' Tuberc., April, 1932, xiii, 439.*—(*A. E. M.*)

Roentgenological Clearing of Tuberculous Lesion.—Clinical cure with clearing of the roentgenographic shadows is least commonly observed in the widely disseminated miliary type of pulmonary tuberculous lesion. A twenty-three-year old man, three months after the onset of an illness characterized by cough, dyspnoea, fever, and fatigue, had a rather abundant haemoptysis which rapidly subsided. The outstanding clinical signs, which were meagre, were severe dyspnoea and dry fine râles sparsely scattered over the lower half of the left lung. The roentgenogram revealed, widely disseminated over both lungs, small miliary shadows, most numerous in the left lung where conglomeration was evident. A regimen of absolute rest, fresh air, and a course of gold salts intravenously was instituted. The case was followed for three and a half years. Symptomatically a complete clinical cure was achieved and the patient was able to return to his usual life. Roentgenologically, the miliary shadows had completely disappeared from both lungs, there remaining, however, a delicate fibrotic band radiating from the left hilum with deviation of the mediastinum to that side. The pathology of this type of lesion is obscure. The lesion is surprisingly well tolerated despite its extent, and the view is expressed that it is probably fibrotic rather than exudative. It is suggested that the prognostication of miliary types of pulmonary lesions be reserved, as the outcome is not invariably fatal.—*Nettoyage radiologique et guérison dans un cas ou existait dans les deux poumons un semis extrêmement confluent d'images micronodulaires, F. Bezancon, E. Bernard and Schwor, Rev. d. l.' Tuberc., April, 1932, xiii, 390.*—(*A. E. M.*)

Tuberculosis of Accessory Pulmonary Lobes.—Tuberculous lesions in an azygos lobe were reported in a previous paper. Study of other accessory pulmonary lobes with emphasis on the possibilities of roentgenological misinterpretation has been continued. Aside from the Rokitansky lobes, which are erratic tongues of pulmonary tissue, four anomalous formations are said to be of greatest frequency: a cardiac lobe, *lobus cavae*, situated between the surface of the diaphragm and the lower lobe, most commonly on the right; a middle posterior lobe, also more common on the right, demarcated from the lower lobe by an anomalous fissure; a middle anterior lobe of the left lung; supplementary lobes of the left apex of which there are many varieties, the most important being the azygos lobe of Wrisberg. In a review of 3,000 roentgenograms no undoubted examples of tuberculous lesions in either Rokitansky lobes, cardiac lobes, or middle posterior lobes were found. Only rarely can the normal roentgenological shadows of these be visualized. Because of their location they are infrequently the seat of incipient tuberculosis. In advanced lesions their outlines are masked by the adjacent parenchymal involvement. However, two roentgenograms presenting triangular opacities in the right base, demarcated by an oblique line which could not have been either of the normal fissures, were tentatively interpreted as tuberculosis of cardiac lobes. Three roentgenograms were found in which unusual shadows in the left apices were interpreted as accessory lobes. One of these was the seat of a tuberculous process, the other two were normal, although one had tuberculous lesions elsewhere in the lung. These anomalous shadows were triangular in shape, with a narrow parietal base and a narrow sharply defined linear extension directed downward and inward to terminate about the level of the clavicular shadow. Artificial pneumothorax, which often accentuates the outlines of aberrant lobes, was instituted in the case with the tuberculous involvement. Although apical adhesions restricted the collapse, it was interesting to note that the limit of the compression coincided with the shadow interpreted as the anomalous fissure. The

possibility that these unusual shadows were either aberrant superior vena cavae, or penicillate pachypleuritides was considered and rejected on anatomical considerations.—*Sur un image radiologique de l'apex gauche; ses aspects dans la tuberculose et le pneumothorax artificiel, ses relations avec le lobe azygos gauche de Wrisberg, B. LeBourdelles, J. Jalet and P. Amiques, Rev.d. l.'Tuberc., April, 1932, xiii, 420.*—(*A. E. M.*)

Accumulation of Iron in Tuberculous Areas.—Previous studies have demonstrated that certain foreign substances, injected into tuberculous animals, accumulate in higher concentrations in tuberculous than in normal tissues. These studies suggest that the accumulation of iron in tuberculous areas may alter the character or course of development of the disease. Bovine tuberculosis was induced in weighed rabbits by the intravenous injection of 0.001 mgm. of a saline suspension of the Ravenel strain. Twenty-six days later the animals were divided into two groups, one group to serve as a control. Intravenous injections of 0.25 per cent ferric chloride were started in the other group, as follows: 1 cc. on the first day; 2 cc. on each of the two following days; 4 or 5 cc. on each of the next six days; and 6 cc. on almost each of the successive days for a period of about two weeks. Subsequently, injections of the ferric salt (6 cc. each time) were made every other day for six weeks. The results showed that repeated intravenous injections of ferric chloride were followed by marked increases in the survival time of tuberculous rabbits. During part of the period of these injections, these animals showed definite increases in weight that exceeded any attained in the control group. However, both control and experimental animals died of generalized tuberculosis with typical lesions which at the time of death were practically indistinguishable from each other.—*The Accumulation of Iron in Tuberculous Areas. II. Survival Time of Tuberculous Rabbits Injected with Ferric Chloride, V. Menkin, J. Exper. Med., January 1, 1932, lv, 101.*—(*F. G. P.*)

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